(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 June 2001 (07.06.2001)

PCT

(10) International Publication Number
WO 01/41368 A1

92126 (US). BASILIER, Henrik; 1632 Ocean View Avenue, Kensington, CA 94704 (US).

[Continued on next page]

(54) Title: COMBINED CDMA MULTI-SERVICE CARRIER AND TDMA/CDMA PACKET CARRIER

(57) Abstract: The present invention provides systems and methods for coordinating calls within hybrid cells that support both an all services carrier and a best-efforts carrier, wherein the all services carrier supports real-time and non-real-time services and the best efforts carrier supports only non-real-time services. In one embodiment of the invention, the all services carrier is a 1xRTT carrier and the best-efforts carrier is an HDR carrier. Calls may be placed on either carrier and transferred between the carriers as circumstances dictate. In addition, the present invention provides systems and methods to dynamically determine the most appropriate carrier for a given call.

BEST AVAILABLE COPY

— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

For two-letter codes and other abbreviations. refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

COMBINED CDMA MULTI-SERVICE CARRIER AND TDMA/CDMA PACKET CARRIER

5   **Field of the Invention**

The present invention relates to wireless communication networks. More particularly, the present invention pertains to systems and methods using a hybrid time division multiple access (TDMA), code division multiple access (CDMA) packet only carrier as a packet data booster for a CDMA multi-service carrier.

10   **Background of the Invention**

The third generation (or "3G") of wireless communication services promises to bring unity to a fractured worldwide cellular market. 3G systems will permit seamless travel not presently available in the splintered U.S. mobile telephone service. In addition, 3G systems promise a wide array of high-speed broadband data transmission and

15   processing, including video, on-board navigation, and Internet access.

One wireless standard designed to support 3G services is cdma2000™, defined by the ITU in its IMT-2000 vision. Phase one of the cdma2000 standard effort, known as "1xRTT" (i.e., Radio Transmission Technology), has already been completed and published by the Telecommunications Industry Association (TIA). 1xRTT refers to

20   cdma2000 implementation within existing spectrum allocations for cdmaOne – 1.25 MHz carriers. The technical term is derived from $N = 1$ (i.e., use of the same 1.25 MHz carrier as in cdmaOne) and the "1x" means one time 1.25 MHz. 1xRTT is backward compatible with cdmaONE networks, but offers twice the voice capacity, data rates of up to 144 kbps, and overall quality improvements.

25   Also employing a 1.25 MHz channel is the High Data Rate (HDR) technology. HDR is RF compatible with cdmaOne and 1sRTT systems and permits side-by-side deployment of transmitters and antennas in existing CDMA towers. Unlike 1xRTT, which is optimized for circuit switched services, HDR is spectrally optimized for best effort packet data transmission. HDR delivers very high-speed CDMA wireless Internet access

at peak data rates greater than 1.8 Megabits per second. Notably, unlike 1xRTT, the control and data channel in an HDR carrier are time multiplexed.

Because of its high speed Internet access, it is preferable to conduct data calls over an HDR carrier, rather than on a 1xRTT carrier. Nevertheless, because HDR is packet

5   based, it does not accommodate real time applications very well. Thus, a user of an HDR carrier who wishes to place a voice call would need to use a carrier such as 1xRTT.

Thus, there is a need in the art for a hybrid wireless system, which allows calls to be transferred between a 1xRTT carrier and an HDR carrier, as circumstances dictate.

10   **Summary of the Invention**

The present invention provides systems and methods for coordinating calls within hybrid cells that support both an all services carrier and a best-efforts carrier, wherein the all services carrier supports real-time and non-real-time services and the best efforts carrier supports only non-real-time services. In one embodiment of the invention, the all

15   services carrier is a 1xRTT carrier and the best-efforts carrier is an HDR carrier. (Note that there are always two carriers for both 1xRTT and HDR: one for the forward link and one for the reverse link. As used herein, "carrier" will collectively refer to both the forward and reverse link carriers.)

In accordance with one aspect of the invention, a mobile station synchronizes to

20   the 1xRTT carrier when in an idle state. If a user wishes to place or receive a voice call or a data call at a low data rate during the idle state, established 1xRTT call flows are followed. If, however, a user wishes to place or receive a data call at the high data rate, the mobile station is first synchronized with the HDR carrier. In one embodiment, a user may set a high data rate switch that, when ON, indicates data calls are to be carried over

25   the HDR carrier. If the high data rate switch is OFF, the data calls are to be carried over the 1xRTT carrier.

In accordance with another aspect of the invention, a mobile station synchronizes to the HDR carrier when in an idle state. If a user wishes to place or receive a data call at the high data rate, established HDR call flows are followed. If, however, a user wishes to

30   place or receive a voice call or a data call at the low rate, the mobile station is first

synchronized with the 1xRTT carrier. In one embodiment, a user may set a voice call block switch that, when ON, indicates the user does not wish to receive voice calls.

Regardless of which carrier a mobile station synchronizes with during an idle state, the mobile station will be on the HDR carrier during a high data rate data call. During such a data call, it is possible an application requiring the real time capabilities of the 1xRTT carrier will arise. For example, the user may want to use a "Voice over IP" application, while using the HDR carrier for Internet access. In accordance with another aspect of the invention, systems and methods are provided to detect the presence of such an application during a high data rate call and to transfer the call to the 1xRTT carrier. In one embodiment, either the network or the mobile station could examine the transmitted packets to determine whether the high data rate call should be transferred to the 1xRTT carrier. In another embodiment, the application requiring the real time capabilities would use an Application Programming Interface to request that high data rate call be transferred to the 1xRTT carrier.

As will be apparent to those skilled in the art, other and further aspects and advantages of the present invention will appear hereinafter.

Brief Description of the Drawings

Preferred embodiments of the present invention are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings, in which like reference numerals refer to like components, and in which:

Fig. 1 is a block diagram of a hybrid 1xRTT/HDR network, according to one embodiment of the invention.

Fig. 2 is a flow chart for the power ON procedure in a mobile station that defaults to the 1xRTT carrier, according to one embodiment of the invention.

Fig. 3 is a call flow diagram for the mobile station of Fig. 3, receiving an incoming data call in the idle state.

Fig. 4 is a call flow diagram for the mobile station of Fig. 3, placing an outgoing data call in the idle state.

Figure 5 is a call flow diagram for the mobile station of Fig. 3, receiving an incoming data call during an active voice call.

Figure 6 is a call flow diagram for the mobile station of Fig. 3, placing an outgoing data call during an active voice call.

5   Figure 7 is a call flow diagram for the mobile station of Fig. 3, receiving an incoming voice call during an active HDR data call.

Figure 8 is a call flow diagram for the mobile station of Fig. 3, placing an outgoing voice call during an active HDR data call.

Figure 9 is a flowchart illustrating the power ON procedure for a mobile station

10   that defaults to the HDR carrier.

Figure 10 is a call flow for the mobile station of Figure 9, receiving a incoming voice call during an idle state.

Figure 11 is a time line for a packet detection method for dynamically selecting the most appropriate carrier in a hybrid network.

15   Figure 12 is a time line for an Application Program Interface method for dynamically selecting the most appropriate carrier in a hybrid network.

Detailed Description of the Preferred Embodiments

Figure 1 illustrates a preferred hybrid 1xRTT/HDR network 100. Users at a

20   mobile station such as a laptop computer 110 having a wireless transceiver or a handset 115 may communicate over either an HDR carrier 120 or a 1xRTT carrier 125. The 1xRTT carrier 125 may carry voice, packet data, or other multi services. The HDR carrier 120 is a carrier used only for the transmission of non-real-time packet data. Transmitters 130 under the control of a base station controller 125 carry both the HDR and the 1xRTT

25   carriers 120 and 125. A mobile switching center 140 connects a public switched telephone network (PSTN) 145 with a base station controller 135.

Voice traffic to and from the PSTN 145 would be carried over the 1xRTT carrier 125. In contrast, data flowing to and from the Internet 150 may be carried by either the 1xRTT carrier 125 or the HDR carrier 120. Packet data from the Internet 150 destined for

30   the HDR carrier 120 may directly enter the base station controller 135 via a packet data core network 155. Data from the Internet 150 destined for the 1xRTT carrier 125 will instead travel via an ISP server 160 to the mobile switching center 140.

The hybrid 1xRTT/HDR network 100 will share a common set of broadcast channels, common mobility handling, and coordinated control channels. Because both the 1xRTT carrier and the HDR carrier are available, a handset at power ON must choose which carrier the handset will "camp" on, and use as the default carrier when in an idle

5   state.

Towards this end, the present invention has two main embodiments: one in which 1xRTT is the default carrier, and one in which HDR is the default carrier. Regardless of which carrier the mobile station is defaulted to, the mobile station will synchronize (or "synch up") with the remaining carrier at certain times. The mobile switching center will

10   always know which carrier a mobile station is defaulting to and will instruct the mobile station when to synchronize with the remaining carrier. This synchronization process is handled by both the base station controller and the mobile station. The base station controller sends the necessary information, e.g., GPS time, access channel code, traffic channel code, etc., to the mobile station, which uses this information to synchronize with

15   the remaining carrier.

    1.   1xRTT Default Carrier

Figure 2 depicts a call flow for a "power ON" in which 1xRTT is the default carrier.

20   At power ON, the mobile station (MS) searches for the 1xRTT pilot, denoted as the All Services Carrier (ASC), at step 200. If the pilot is unavailable, the MS will search for the HDR pilot, denoted as the Packet Data Carrier (PDC), at step 201. Should neither pilot be available, the MS is authenticated for analog service and registered in the Home Location Register (HLR), or the mobile switching center, at step 202, so that analog

25   service may begin at step 203.

Assuming the 1xRTT pilot is available at step 200, the MS checks to see if it is capable of hybrid operation at step 205. If it is not, the MS is authenticated for standard 1xRTT service and registered in the Home Location Register (HLR) of the mobile switching center at step 210, so that standard 1xRTT service may begin at step 225.

30   Preferably, the MS is capable of hybrid operation, wherein the MS searches for the HDR carrier at step 230. Note that in an early implementation of the invention, the coverage area of the HDR carriers may be smaller than the area covered by the 1xRTT carriers. Thus, it is possible for the MS to not find the HDR carrier, whereupon the

authentication and registration step 210 is repeated at step 240. The MS will continue to search for the HDR carrier at step 250. Should the MS travel into a hybrid cell and begin to receive the HDR carrier, the MS will be authenticated for HDR, registered in the Packet Data Switched Network (PDSN), and assigned an IP address at step 255.

5   Note that if the MS has found the HDR pilot at step 201, the MS will synchronize with the 1xRTT carrier at step 260. After "synching" with the carrier, the MS is authenticated, registered in the HLR, registered in the PDSN, and assigned an IP address at step 265. Note that this same step is performed should the HDR carrier be located in step 230. Finally, the MS is synchronized with the 1xRTT carrier at step 270.

10   After power ON is completed, the MS is defaulted to the 1xRTT carrier. Thus, should the mobile station be idle and either place or receive a voice call, normal incoming or outgoing voice call 1xRTT procedures are followed. Note that this is not the case should the MS be idle and an incoming data call be received, e.g., an incoming e-mail or content being pushed from the Internet. Similarly, if the user were on a 1xRTT data call, a

15   voice call may be placed or received following established 1xRTT procedures.

           In Figure 3, the call flow for an incoming data call while the MS is an idle state is illustrated. Because the MS is on the 1xRTT carrier and has an IP address, the PDCN notifies the base station controller of the data call at step 200. The base station controller notifies the mobile switching center of the call over the A-interface, so that the mobile

20   switching center may check the Class of Service (COS) at steps 205 and 210. In one embodiment, the mobile station automatically receives incoming data calls through the use of an "automatic switch." Such a switch could be configured from either hardware, or software, or their combination. Similarly, the mobile station could also be provided with a data rate switch that indicates whether the phone would automatically receive the data call

25   on the HDR carrier (high data rate), or on the 1xRTT carrier (low data rate).

           Should the automatic switch be ON, the MS checks whether the High data rate switch is ON at step 215. Assuming the high data rate switch is ON, the MS will synchronize with the HDR carrier and switch over to the HDR carrier. The MS may then be connected to the PDCN and receive its data call. After completing the data call, the MS

30   must be resynchronized with the 1xRTT carrier. If the high data rate switch is OFF, the call flow resumes at step 220. Because the MS is already on the 1xRTT carrier, it may directly receive the data call. Moreover, a user of the MS would have the option to simultaneously receive/place a voice call if the high data rate switch is OFF.

If the automatic switch is OFF, the call flow continues at step 225. Here, a user of the MS would not automatically receive the data call. Instead, the MS would receive a Short Message Service (SMS) message, asking the user whether the incoming data call should be accepted. If the user accepts the call, the MS would receive a second SMS message, asking the user whether the data call should use the high or low data rate. If "high data rate" is selected, the call flow continues at step 230. This call flow is as described with respect to step 215 – i.e., the MS will synchronize with the HDR carrier, connect to the PDCN and receive the data call. Upon completion of the call, the MS must resynchronize with the 1xRTT carrier.

Should the user select to receive the data call on the low data rate channel (1xRTT), the call flow proceeds at step 235. Because the MS is already on the 1xRTT carrier, it may directly receive the data call in such a case. Moreover, a user of the MS would have the option to simultaneously receive/place a voice call if the high data rate switch is OFF. Should the user not accept the data call at step 225, the call flow proceeds at step 240. In such a case, the MS remains on the 1xRTT carrier and no data is received.

Turning to Figure 4, the converse of the call flow of Figure 3 is illustrated. In this situation, the MS is in an idle state and the user places an outgoing data call, e.g., by sending an e-mail or accessing a web page. Should the automatic switch be ON, the call flow proceeds at step 250. The MS would then check whether the user has set to the high data rate switch ON. If the high data rate switch is ON, the call flow proceeds at step 255. Assuming the high data rate switch is ON, the MS will synchronize with the HDR carrier and switch over to the HDR carrier. The MS may then be connected to the PDCN and place its outgoing data call. After completing the data call, the MS must be resynchronized with the 1xRTT carrier.

If the high data rate switch is OFF, the call flow proceeds at step 260. Because the MS is already on the 1xRTT carrier, it may directly place the outgoing data call. Moreover, the user would have the option to simultaneously receive/place a voice call if the high data rate switch is OFF.

If the automatic switch is OFF, the call flow continues at step 270. Here, the user would not automatically place the data call. Instead, the MS would receive an SMS message, asking the user whether the outgoing data call should be placed on the HDR carrier (high data rate) or on the 1xRTT carrier (low data rate). Should the user select the high data rate at step 275, the MS will synchronize with the HDR carrier, switch over to

and use the HDR carrier for transfer of data, connect to the PDCN, and place the outgoing data call. Upon completion of the call, the MS must resynchronize with the 1xRTT carrier. Alternatively, should the user select to place the data call on the low data rate channel (1xRTT), the call flow proceeds at step 280. Because the MS is already on the

5   1xRTT carrier, it may directly place the data call. Moreover, the user would also have the option to simultaneously receive/place a voice call.

Figures 3 and 4 illustrate the call flows for placing and receiving a data call while the mobile station is in an idle state. However, the mobile station could also receive or place a data call during an active voice call.

10   Turning to Figure 5, the call flow for receiving an incoming data call during an active voice call is illustrated. At step 300, the Packet Data Core Network (PDCN) notifies the base station controller of the incoming data call. Subsequently, the base station controller notifies the mobile switching center of the data call via the A-interface so that the mobile switching can check the Class of Service for the MS. The MS checks

15   whether the automatic switch is ON at step 310. Should the automatic switch be ON, the high data rate switch is checked at step 315. If the high data rate switch is ON at step 315, the active voice call must be placed on hold – i.e., since HDR is incompatible with the real-time requirements of an active voice call. Thus, mobile switching center places the caller on hold and informs the caller with a recorded announcement (RCAN). The MS

20   then synchronizes with the HDR carrier and switch over to the HDR carrier. The MS may then be connected to the PDCN and receive the incoming data call. After completing the data call, the MS must be resynchronized with the 1xRTT carrier to reconnect the voice call. If the high data rate is OFF (step 320), the MS may simultaneously receive the incoming data call on the 1xRTT carrier it was already on.

25   The call flow when the automatic switch is OFF proceeds at step 325. The user is notified of the incoming data call with an SMS message and asked whether the call should be received. Should the user accept the call, an additional SMS message inquires whether the user wishes to receive the call at the high or low data rate at step 330. Note that if the user wishes to receive the data call at the high data rate, the active voice call must be

30   placed on hold. Thus, the caller is placed on hold and informed of the situation with a recorded announcement. The MS will then synchronize with the HDR carrier and switch over to the HDR carrier. The MS may then be connected to the PDCN and receive its incoming data call. After completing or disconnecting the data call, the MS must be

resynchronized with the 1xRTT carrier to bring back the voice call. If the high data rate is not selected (step 335), the MS may simultaneously receive the incoming data call on the 1xRTT carrier it was already on.

Finally, should the automatic switch be OFF at step 310, the incoming data call is
5   not accepted at step 340.

The converse of the call flows of Figure 5 is illustrated in Figure 6.

Here, the user wishes to place an outgoing data call during an active voice call. The MS checks whether the automatic switch is ON at step 350. If the automatic switch is ON, the high data rate switch is checked at step 355. If the high data rate switch is ON at
10   step 355, the active voice call must be placed on hold. Thus, mobile switching center places the caller on hold and informs the caller with a recorded announcement (RCAN). The MS will then synchronize with the HDR carrier and switch over to the HDR carrier. The MS may then be connected to the PDCN and place its outgoing data call, e.g., to sent e-mail or browse web content.

15   After completing the data call, the MS must be resynchronized with the 1xRTT carrier to bring back the voice call. If the high data rate is OFF (step 360), the MS may simultaneously place the outgoing data call on the 1xRTT carrier it was already on.

The call flow when the automatic switch is OFF proceeds at step 365. The user is asked with a SMS message whether the call should be placed at the high or low data rate.
20   Note that if the user wishes to receive the data call at the high data rate, the active voice call must be placed on hold. Thus, the caller is placed on hold and informed of the situation with a recorded announcement. The MS will then synchronize with the HDR carrier and switch over to the HDR carrier. The MS may then be connected to the PDCN and place its outgoing data call. After completing or disconnecting the data call, the MS
25   must be resynchronized with the 1xRTT carrier to bring back the voice call. If the high data rate is not selected (step 370), the MS may simultaneously place the outgoing data call on the 1xRTT carrier it was already on.

Just as a mobile station may receive a data call during an active voice call, it may also receive an incoming voice call during an active high data rate (HDR) data call.
30   Turning to Figure 7, the call flow for such a situation is illustrated. In one embodiment of the invention, the Class of Service may include a Voice Call Block. The Voice Call Block feature would be selected by the user to indicate whether voice calls should be automatically blocked during an active HDR data call. Because the HDR data call would

have to be switched to the 1xRTT carrier at a lower data rate to receive the incoming voice call, the user may decide to keep the activate the Voice Call Block to preserve a high data rate. In such a situation, illustrated at step 380, the call is blocked and the caller is informed of the block with a recorded announcement.

Should the Automatic Voice Switch be ON, indicating the user wishes to automatically receive voice calls, the call flow proceeds at step 390. Here, the high data rate switch is checked. Should the high data rate switch be ON at step 400, the call is blocked and the call is informed of the block with a recorded announcement. If, however, the high data rate switch is OFF at step 410, the MS is synchronized with the 1xRTT carrier so that the data call may switch over to the 1xRTT carrier and continue at the low data rate. The MS may then accept the incoming voice call on the 1xRTT carrier.

Should the Automatic Voice Switch be OFF, the call flow proceeds at step 420. In this case, the user receives an SMS message asking whether the incoming voice call should be received. If the user accepts the call, an additional SMS message is sent to inform the user that use of the high data rate is no longer available. The MS must then synchronize with the 1xRTT carrier and continue the data call on the 1xRTT carrier. The incoming voice call may then be accepted over the 1xRTT carrier also. If the user does not accept the incoming call, the call is rejected at step 430 and the caller informed with a recorded announcement.

The converse of the call flow of Figure 7 is illustrated in Figure 8.

In this instance, the user places an outgoing voice call during an active high data rate (HDR) data call. Should the user initiate a voice call, the user is informed with an SMS message that the high data rate will be lost at step 440. If the user accepts the loss of the high data rate, the call flow proceeds at step 445. In this case, the MS must synchronize with the 1xRTT carrier so that the data call may continue on the 1xRTT carrier. The user may then place the voice call on the 1xRTT carrier. If the user does not wish to lose the high data rate, the voice call is not placed at step 450.

In accordance with this general aspect of the present invention, coordinated switching of the MS between the 1xRTT carrier and the HDR carrier within a given cell is accomplished. However, it is possible that some cells may only support 1xRTT. Thus, the invention also provides handoff procedures at the boundaries between "hybrid" and "1xRTT-only" cells.

For example, a mobile station may be within a hybrid cell and travel to a cell supporting only 1xRTT. If the mobile station was idle, it can simply handoff to the 1xRTT carrier in the 1xRTT cell. If, however, a high data rate call was active in the hybrid cell, then the data call must be switched over to the lower data rate 1xRTT carrier

5   as the mobile station travels into the 1xRTT cell. Thus, the MS would have to synchronize with the 1xRTT carrier and switch the data call to the 1xRTT carrier, or the call would be lost in the 1xRTT cell. Preferably, an SMS message would notify the user that the call is continuing at the lower data rate. Note that an active voice call could have been on hold with the active HDR call. In this case, the voice call would become active as

10   the data call switched over to the low data rate 1xRTT carrier.

Similarly, if a low data rate call (on the 1xRTT carrier) was active in the hybrid cell, the MS must still synchronize with the 1xRTT carrier in the 1xRTT cell. However, the data call would continue at the same data rate. Also at the low data rate within the hybrid cell would be an active voice call. In such a case, 1xRTT handoff procedures

15   would be followed as the MS traveled into the 1xRTT cell, allowing the voice call to stay active.

Conversely, a mobile station could be located within a 1xRTT cell, and then travel into a hybrid cell supporting both 1xRTT and HDR. If no calls were active, the MS need merely synchronize with the 1xRTT carrier within the hybrid cell. If a data call was active

20   in the 1xRTT cell, the data call may be switched to the higher data rate HDR carrier as the mobile station travels into the hybrid cell. Preferably, the user would be notified with an SMS message that the data call has been switched to the higher data rate. If either a voice call or a simultaneous voice and data call was active in the 1xRTT cell, the call could not be switched to the HDR carrier as the mobile station travels into the hybrid cell.

25

2.   HDR as the Default Carrier.

Turning to Figure 9, the "power ON" procedure for a mobile station that uses HDR as the default carrier is illustrated. Because this power ON procedure is substantially similar to the procedure described with respect to Figure 2, only the differences are

30   highlighted for ease in illustration. In particular, the only difference is at the final step 460, wherein the mobile station is resynchronized with the HDR carrier to make this the default carrier.

Because HDR is the default carrier in the idle state, the mobile station cannot directly receive or place voice calls. Note that if a user receives a voice call, data calls must use the lower data rate offered by the 1xRTT carrier. Thus, a useful feature is an "automatic switch." If the automatic switch is ON, a user directly receives an incoming

5   voice call. If the automatic switch is OFF, the use is inquired whether the voice call should be connected. By setting the automatic switch to OFF, a user may opt to not receive the call to preserve the higher data rate offered by the HDR carrier.

Turning to Figure 10, the call flow for receiving an incoming voice call, while the mobile station is in the idle state is illustrated. At step 470, the mobile switching center

10   checks the Class of Service for whether the automatic switch is ON. If the automatic switch is ON, the mobile switching center instructs the mobile station to search for the 1xRTT carrier and synchronize with it. Upon finding the 1xRTT carrier, the MS informs the mobile switching center and switches to the 1xRTT carrier. On notification that the 1xRTT carrier is found, the mobile switching center sends the call to the mobile station.

15   When the call is complete and the mobile switching center receives a RELEASE message, the mobile switching center instructs the mobile station to resynchronize with the HDR carrier.

If the automatic switch is OFF, the call flow proceeds at step 480. Here, the mobile switching center sends an SMS message to the user informing the user that an

20   incoming call has been received. Should the user accept the call, the mobile switching center instructs the mobile station to search for the 1xRTT carrier. Upon finding the 1xRTT carrier and informing the mobile switching center, the mobile station switches to the 1xRTT carrier. The mobile switching center may then send the call to the MS. After the call is complete and the mobile switching center receives a RELEASE message, the

25   mobile switching center instructs the mobile station to resynchronize with the HDR carrier. If the user does not accept the call, it is rejected at step 490.

The converse of the call flow of Figure 10 is now discussed. In this situation, the user is in the idle state, defaulting to the HDR carrier, and wishes to place an outgoing voice call by pressing the SEND button. The mobile switching center then instructs the

30   MS to search for the 1xRTT carrier. Upon finding the 1xRTT carrier and informing the mobile switching center, the mobile station switches to the 1xRTT carrier. The mobile switching center may then send the call to the PSTN or another mobile station, depending upon the call's destination. After the call is complete and the mobile switching center

receives a RELEASE message, the mobile switching center instructs the mobile station to resynchronize with the HDR carrier.

Unlike a voice call, because the mobile station is defaulted to the HDR carrier, it may directly receive or place a high rate data call on the HDR carrier. The call flow for receiving an incoming data call while in the idle state is discussed first. In such a case, the Packet Data Server Node (PDSN) notifies the base station controller of the incoming data call. The base station controller will then notify the mobile switching center of the call via the A-interface. After the mobile switching center checks the user's Class of Service, the mobile station may be connected to the Packet Data Core Network (PDCN) until the call is completed and the mobile station disconnects.

The call flow for placing an outgoing data call while in the idle state is similar. The mobile station initiates the data call so that the mobile station may be connected to the PDCN until the call is complete and the mobile station disconnects the data call.

Note that if a user wishes to place or receive a data call during an active voice call, the MS must already be on the 1xRTT carrier. Thus, call flows for placing and receiving data calls during an active voice call are as described with respect to Figures 5 and 6. Conversely, if the user wishes to receive or place a voice call during an active data call, the mobile station is synchronized with the HDR carrier. Thus, call flows for placing and receiving voice calls during an active high data rate call are as described with respect to Figures 7 and 8.

Note that in the embodiment of the invention just described, the mobile station defaults to the HDR carrier while in the idle state. However, it is possible that a given cell may only support 1xRTT. Thus, the invention also provides handoff procedures at the boundaries between hybrid and 1xRTT-only cells.

For example, a mobile station may be within a hybrid cell and travel to a cell supporting only 1xRTT. If the mobile station was idle, it must synchronize with and acquire the 1xRTT carrier as it travels into the 1xRTT cell. If, however, a high data rate call was active in the hybrid cell, the mobile station must synchronize with 1xRTT carrier and switch the data call over to the lower data rate 1xRTT carrier as the mobile station travels into the 1xRTT cell. Preferably, an SMS message would notify the user that the call is continuing at the lower data rate. Note that an active voice call could have been on hold with the active HDR call. In this case, the voice call would become active as the data call switched over to the low data rate 1xRTT carrier. Similarly, if a low data rate call (on

the 1xRTT carrier) was active in the hybrid cell, the MS must still synchronize with the 1xRTT carrier in the 1xRTT cell. However, the data call would continue at the same data rate. If the 1xRTT carrier within the hybrid cell has an active voice call, the 1xRTT handoff procedures would be followed as the MS traveled into the 1xRTT cell, allowing

5   the voice call to remain active.

Conversely, a mobile station could be within a 1xRTT cell and travel into a hybrid cell supporting both 1xRTT and HDR. If no calls were active, the MS need merely synchronize with the HDR carrier within the hybrid cell. If a data call was active in the 1xRTT cell, the data call may be switched to the higher data rate HDR carrier as the

10   mobile station travels into the hybrid cell. Preferably, the user would be notified with an SMS message that the data call has been switched to the higher data rate. If either a voice call or a simultaneous voice and data call was active in the 1xRTT cell, the call could not be switched to the HDR carrier as the mobile station travels into the hybrid cell. Instead, standard 1xRTT hand off procedures would be followed.

15

3. Dynamic Selection of the Most Appropriate Carrier

In another aspect of the invention, methods are provided for detecting whether an application running over an data call requires a transfer from the best-efforts carrier (non-real time) to the all services carrier (real time). In one embodiment of the invention, the

20   all-services carrier is a 1xRTT carrier and the best-efforts carrier is an HDR carrier. An example of such an application is a Voice over IP call. Two main embodiments are provided: a packet detection method and an Application Programming Interface method.

Turning now to Figure 11, a timeline for the packet detection method is illustrated. Prior to time a, a high data rate call is active over the HDR carrier such that packet data is

25   transferred between the mobile station and the network. Next, an application running over the call causes packets to be sent requiring the real time capabilities of the 1xRTT carrier (such as a Voice over IP call). Either the mobile station or other components in the network could detect this requirement by examining the transmitted packets by, for example, identifying the UDP port number. If the packets indicate that the 1xRTT carrier

30   is required, the mobile station would synchronize to and transfer the call over to the 1xRTT as shown at time a. At time b, the application requiring the real time capabilities of the 1xRTT carrier would no longer do so (for example, a Voice over IP call may have terminated.) In one embodiment of the invention, the mobile station could set a timer after

the last packet was transferred, which would typically be just before time b. When the timer expires at time c, if no other applications requiring real time service are running, the mobile station could synchronize to and transfer the data call over to the HDR carrier.

Turning now to Figure 12, a time line for the Application Programming Interface method is illustrated. Initially, at time 500, a high data rate call is also active over the HDR carrier. An application running on the mobile station would determine that the real-time capabilities of the 1xRTT carrier are required and would trigger an Application Programming Interface to request a transfer of the high data rate call to the 1xRTT carrier at time 510. The mobile station would then synchronize to, and transfer the call over to, the 1xRTT carrier as shown at time 520. When the application determines that the 1xRTT carrier is no longer required, the Application Programming Interface would then request a transfer back to the HDR carrier as shown at time 530. The mobile station would then synchronize to and transfer the data call over to the HDR carrier.

While the many aspects of the present invention are susceptible to various modifications and alternative forms, specific examples thereof have been shown by way of example in the drawings and are herein described in detail. It should be understood, however, that the invention is not to be limited to the particular forms or methods disclosed, but to the contrary, the invention is to cover all modifications, equivalents, and alternatives falling within the scope of the appended claims.

16

CLAIMS

What is claimed is:

1.   A method of wireless communication, comprising:

(a) synchronizing, during an idle state, a mobile station to a default carrier selected from a group comprising an all-services carrier and a best-efforts carrier, the all-services carrier supporting real-time and non-real-time services, the best-efforts carrier supporting only non-real-time services;

(b) synchronizing the mobile station to the remaining carrier, then;

(c)   connecting a call to the mobile station over the remaining carrier; and

(d) synchronizing the mobile station to the default carrier upon completion of the call.

2.   The method of claim 1, wherein the default carrier is a 1xRTT carrier, the remaining carrier is a HDR carrier, and the call is a data call.

3.   The method of claim 1, wherein the default carrier is a HDR carrier, the remaining carrier is a 1xRTT carrier, and the call is a voice call.

4.   The method of claim 2 or 3, further comprising notifying the mobile station to synchronize with the remaining carrier in anticipation of step (c).

5.   The method of claim 4, wherein prior to notifying the mobile station to synchronize with the remaining carrier, the mobile station has an active voice call in progress over the 1xRTT carrier, the active voice call being placed on hold during steps (b), (c) and (d).

6.   The method of claim 2, wherein during step (c), the method further comprises:

notifying the mobile station to synchronize with the HDR carrier because of an incoming data call;

placing the voice call on hold;

synchronizing the mobile station to the HDR carrier;

accepting the data call over the 1xRTT carrier; and

17

upon completion of the data call, synchronizing the mobile station to the 1xRTT carrier and reconnecting the voice call.

7.   A wireless communication network configured to allow a call to be selectively carried over either an all-services carrier or a best-efforts carrier, the all-services carrier supporting real-time and non-real-time services, the best-efforts carrier supporting only non-real-time services.

8.   The communication network of claim 7, wherein the all-services carrier is a 1xRTT carrier, and the best-efforts carrier is a HDR carrier.

9.   The communication network of claim 7, wherein the best-efforts carrier is a packet data carrier.

10.   The communication network of claim 7, wherein the network is configured to:

         connect a data call to a mobile station over the best-efforts carrier;

         upon detecting a specified condition occurring while the data call is in progress, synchronize the mobile station to the all-services carrier, and

         continue the data call over the all-services carrier.

11.   The communication network of claim 10, wherein the specified condition is detected by examining transmitted packet data.

12.   The communication network of claim 10, wherein the specified condition is detected by an Application Programming Interface within the mobile station.

13.   A wireless communication network configured to allow a call to be selectively carried over either an all-services carrier or a best-efforts carrier, the all-services carrier supporting real-time and non-real-time services, the best-efforts carrier supporting only non-real-time services, the network further configured to

         synchronize, during an idle state, a mobile station to a default carrier comprising either the all-services carrier or the best-efforts carrier;

18

synchronize the mobile station to the remaining carrier upon receipt of an incoming call;

connect the incoming call to the mobile station over the remaining carrier; and

synchronize the mobile station to the default carrier upon completion of the call.

14.   The communication network of claim 13, wherein the default carrier is a 1xRTT carrier, the remaining carrier is a HDR carrier, and the call is a data call.

15.   The communication network of claim 13, wherein the default carrier is a HDR carrier, the remaining carrier is a 1xRTT carrier, and the call is a voice call.

16.   The communication network of claim 14, the network further configured to notify the mobile station to synchronize with the remaining carrier upon notice of the incoming data call at a mobile station controller.

17.   The communication network of claim 16, wherein prior to notifying the mobile station to synchronize with the HDR carrier, the mobile station has an active voice call in progress over the 1xRTT carrier, the network configured to place the active voice call on hold while the mobile station is synchronized to the HDR carrier.

18.   The communication network of claim 15, wherein the network is further configured to:

notify the mobile station to synchronize with the 1xRTT carrier because of an incoming voice call;

synchronize the mobile station to the 1xRTT carrier;

transfer the data call to the 1xRTT carrier; and

accept the voice call over the 1xRTT carrier.

19.   The communication network of claim 14, wherein the network is further configured to:

notify the mobile station to synchronize with the HDR carrier because of an incoming data call;

place the voice call on hold;

synchronize the mobile station to the HDR carrier;

accept the data call over the 1xRTT carrier; and

upon completion of the data call, synchronize the mobile station to the

5   1xRTT carrier and reconnecting the voice call.

20.   A method of wireless communication, comprising:

providing a hybrid network, the hybrid network enabling a call to be

selectively carried over either a 1xRTT carrier or an HDR carrier;

10   connecting a data call a mobile station over the HDR carrier;

determining that the data call should be carried over the 1xRTT carrier;

synchronizing the mobile station to the 1xRTT carrier, and

continuing the data call over the 1xRTT carrier.

15   21.   The method of claim 20, wherein the determining step comprises examining

transmitted packet data.

22.   The method of claim 20, wherein the determining step is performed by an

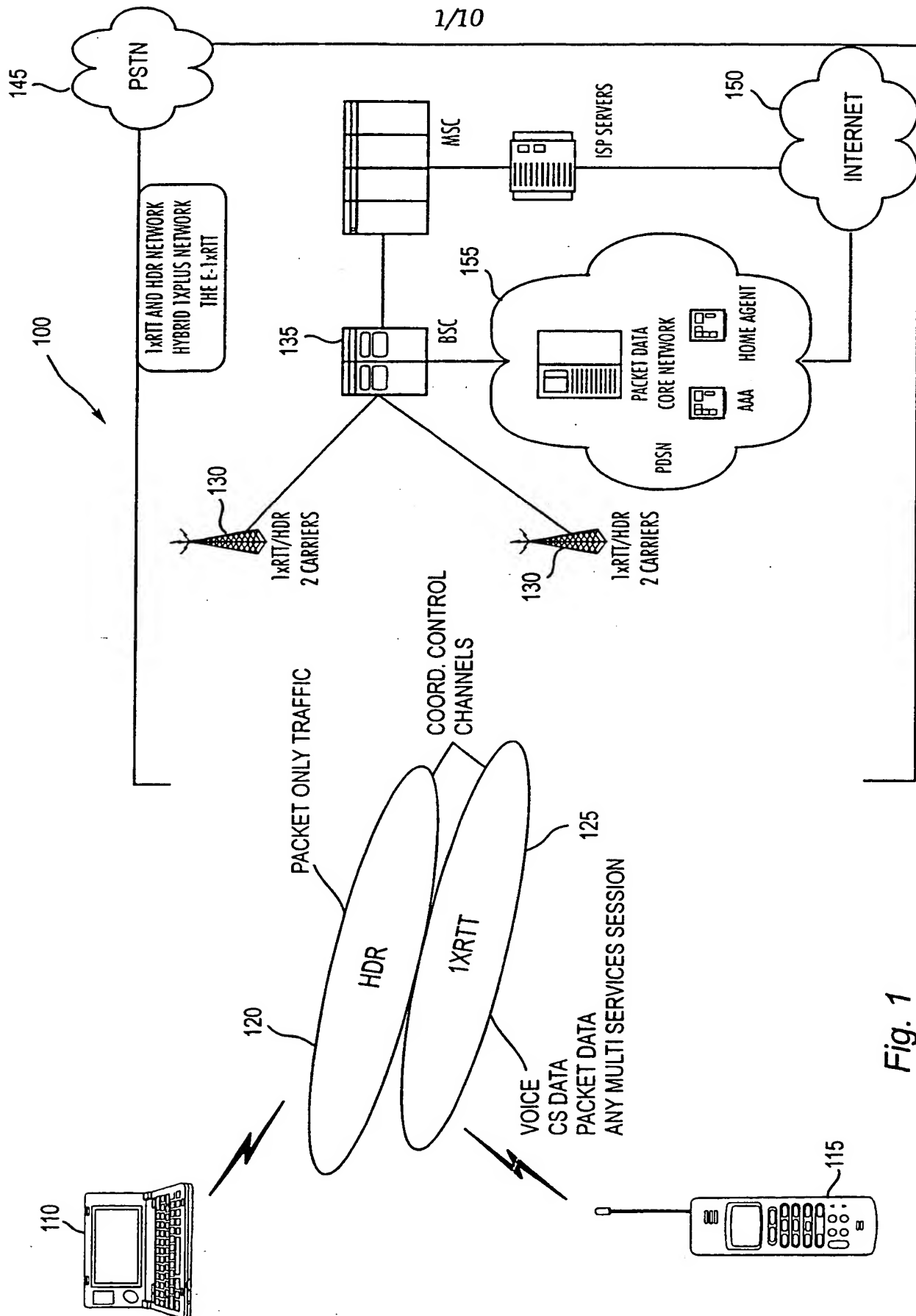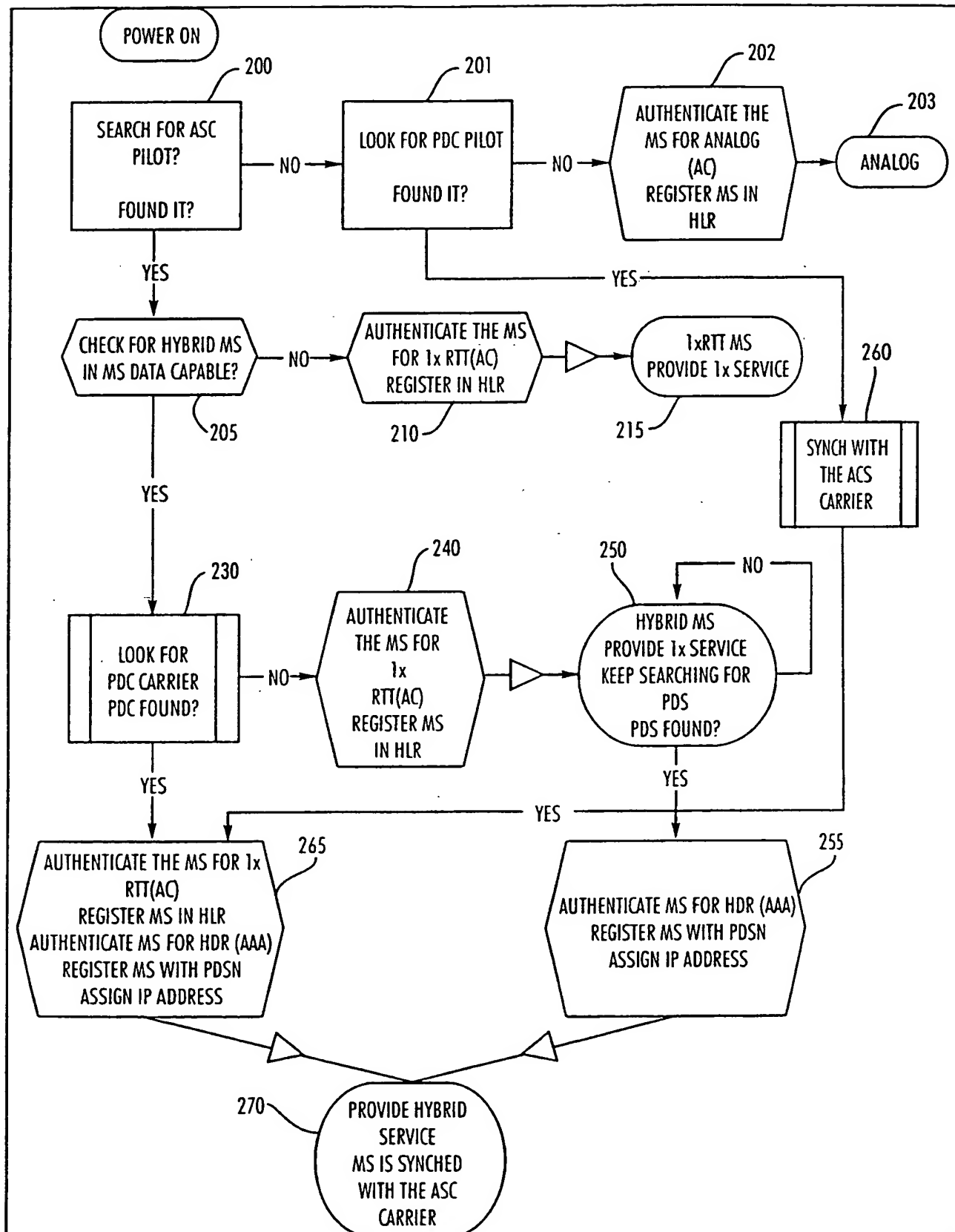Application Programming Interface within the mobile station.

20

1/10

Fig. 1

Fig. 2

3.6   INCOMING DATA CALL IN IDLE STATE

MS is on ASC
MS has IP address
PDCN notifies BSC of call   — 200
BSC notifies MSC of call via A- interface   — 205
MSC checks COS —— 210
If automatic switch over is ON   — 215
   If is High data rate is ON
     Synch with PDC
     Switch MS to PDC
     Connect MS to PDCN → Call is ON   Call Complete
     MS disconnect data call
     Synch back with ASC   — 220
   Else
     Use the low rate data of 1xRTT
     MS can use simultaneous data and voice
Else — 225
   Send an SMS with incoming data call (Y/N)
   If MS accepts call
     Send SMS message, Would you like to use high or low data
     If high data rate is selected   — 230
       Synch with PDC
       Switch MS to PDC
       Connect MS to PDCN → Call is ON
       MS disconnect data call
       Synch with ASC
     Else
       Use the low rate data of 1xRTT   — 235
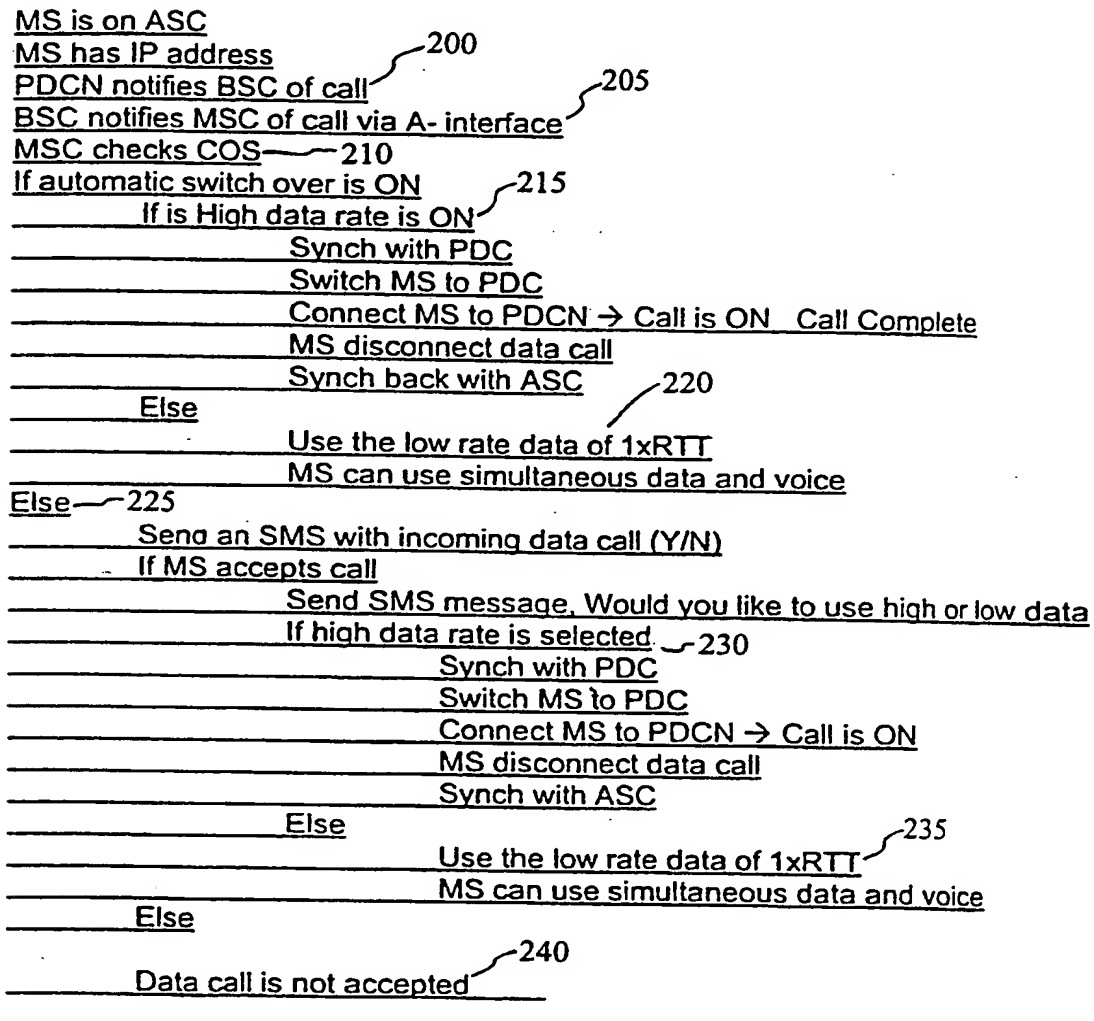   MS can use simultaneous data and voice
   Else
     Data call is not accepted   — 240

Fig. 3

3.7   OUTGOING DATA CALL IN IDLE STATE

MS is on ASC
MS has IP address
MS initiates a data call ⟋250
If automatic switch over is ON ⟋255
      If is High data rate is ON ⟋255
          Synch with PDC
          Switch MS to PDC
          Connect MS to PDCN → Call is ON
          MS disconnect data call
          Synch back with ASC
      Else —— 260
          Use the low rate data of 1xRTT
          MS can use simultaneous data and voice
Else ⟋270
      Send SMS message, Would you like to use high or low data
      If high data rate is selected ——— 275
          Synch with PDC
          Switch MS to PDC
          Connect MS to PDCN → Call is ON
          MS disconnect data call
          Synch with ASC
      Else —— 280
          Use the low rate data of 1xRTT
          MS can use simultaneous data and voice

Fig. 4

NSDOCID: <WO   0141368A1 I >

3.8   INCOMING DATA CALL WHILE ON VOICE

MS is on ASC
MS has IP address
PDCN notifies BSC of call   ⟋300
BSC notifies MSC of call via A- interface
MSC checks COS
If automatic switch over is ON⟋310
_____Check Fundamental Data rate feature
_____If is High data rate is ON _____
_____Place caller on hold in the MSC   315
_____Inform voice call of situation (RCAN)
_____Call is still active in the BSC and MSC (Billing is ON)
_____Synch with PDC
_____Switch MS to PDC
_____Connect MS to PDCN → Call is ON
_____MS has control to switch back to voice call
_____MS disconnect data call
_____Synch with ASC
_____Bring back voice call
_____Else ⟋320
_____Use the low rate data of 1xRTT
_____325 MS can use simultaneous data and voice
Else ⟋325
_____Send an SMS with incoming data call (Y/N)   330
_____If MS accepts call
_____Send SMS message, Would you like to use high or low data
_____If high data rate is selected
_____Place caller on hold in the MSC
_____Inform voice call of situation (RCAN)
_____Call is still active in the BSC
_____and MSC-Billing On
_____Synch with PDC
_____Switch MS to PDC
_____Connect MS to PDCN → Call is ON
_____MS has control to switch back to voice
_____call
_____MS disconnect data call
_____Synch with ASC
_____Bring back voice call
_____Else ⟍335
_____Use the low rate data of 1xRTT
_____MS can use simultaneous data and voice
_____Else
_____Data call is not accepted ⟋340

Fig. 5

ISDOCID: <WO___0141368A1_I_>

3.9   <u>OUTGOING DATA CALL WHILE ON VOICE</u>

<u>MS is on ASC</u>
<u>MS has IP address</u>   350
<u>MS initiates a data call</u>
<u>If automatic switch over is ON</u>   355
   <u>Check Fundamental Data rate feature</u>
   <u>If is High data rate is ON</u>
     <u>Place caller on hold in the MSC</u>
    <u>Inform voice call of situation (RCAN)</u>
    <u>Call is still active in the BSC and MSC (Billing is ON)</u>
   <u>Synch with PDC</u>
    <u>Switch MS to PDC</u>
    <u>Connect MS to PDCN → Call is ON</u>
    <u>MS disconnect data call</u>
   360 <u>Synch back with ASC</u>
     <u>Bring back voice call</u>
 <u>Else</u>

   365 <u>Use the low rate data of 1xRTT</u>
    <u>MS can use simultaneous data and voice</u>
<u>Else</u>
 <u>Send SMS message. Would you like to use high or low data</u>
 <u>If high data rate is selected</u>
    <u>Place caller on hold in the MSC</u>
    <u>Inform voice call of situation (RCAN)</u>
    <u>Call is still active in the BSC and MSC-Billing On</u>
    <u>Synch with PDC</u>
    <u>Switch MS to PDC</u>
    <u>Connect MS to PDCN → Call is ON</u>
    <u>MS disconnect data call</u>
  370 <u>Synch with ASC</u>
    <u>Bring back voice call</u>
 <u>Else</u>

    <u>Use the low rate data of 1xRTT</u>
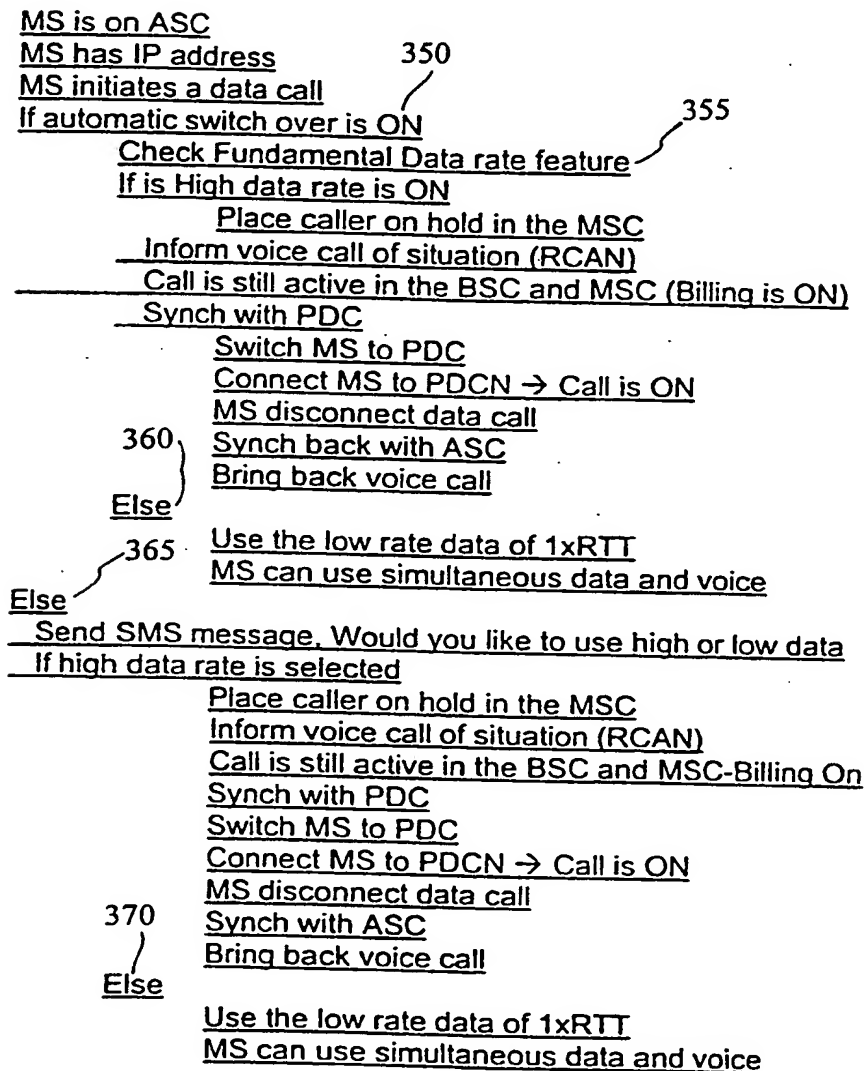   <u>MS can use simultaneous data and voice</u>

Fig. 6

Fig. 7

3.12   INCOMING VOICE CALL WHILE ON DATA (HYBRID)

MS is on the PDC carrier
MSC get a voice call
Check COS for Voice Automatic Switch over
If feature is on block
 Block the call ————— 380
 Give RCAN
Else   ————390
If feature is ON
 Check Supplemental Data rate feature
 If the High data rate is ON ————— 400
    Cannot accept the call
    Caller is informed with RCAN
   Else   ————410
    Synch with ASC
    Continue the data call on lower data
    Accept the voice call
    Treat call as 1XRTT
Else ————420
 Send SMS to user, voice call is coming, accept call ?
 If caller accepts call
      Send SMS to user , "High data rate is no longer available"
    Synch with ASC
    Continue the data call on lower data
    Accept the voice call
    Treat call as 1XRTT
 Else   ————430
   Call is rejected

    Caller is informed with RCAN

Fig. 8   OUTGOING VOICE CALL WHILE ON DATA (HYBRID)

MS is on the PDC carrier
MS initiates a voice call   —440
Send SMS to user " Are you sure, you will loose your high data rate ?"
If the user accepts ————445
   Synch with ASC
   Continue the data call on lower data
   Make the voice call
   Treat call as 1XRTT call
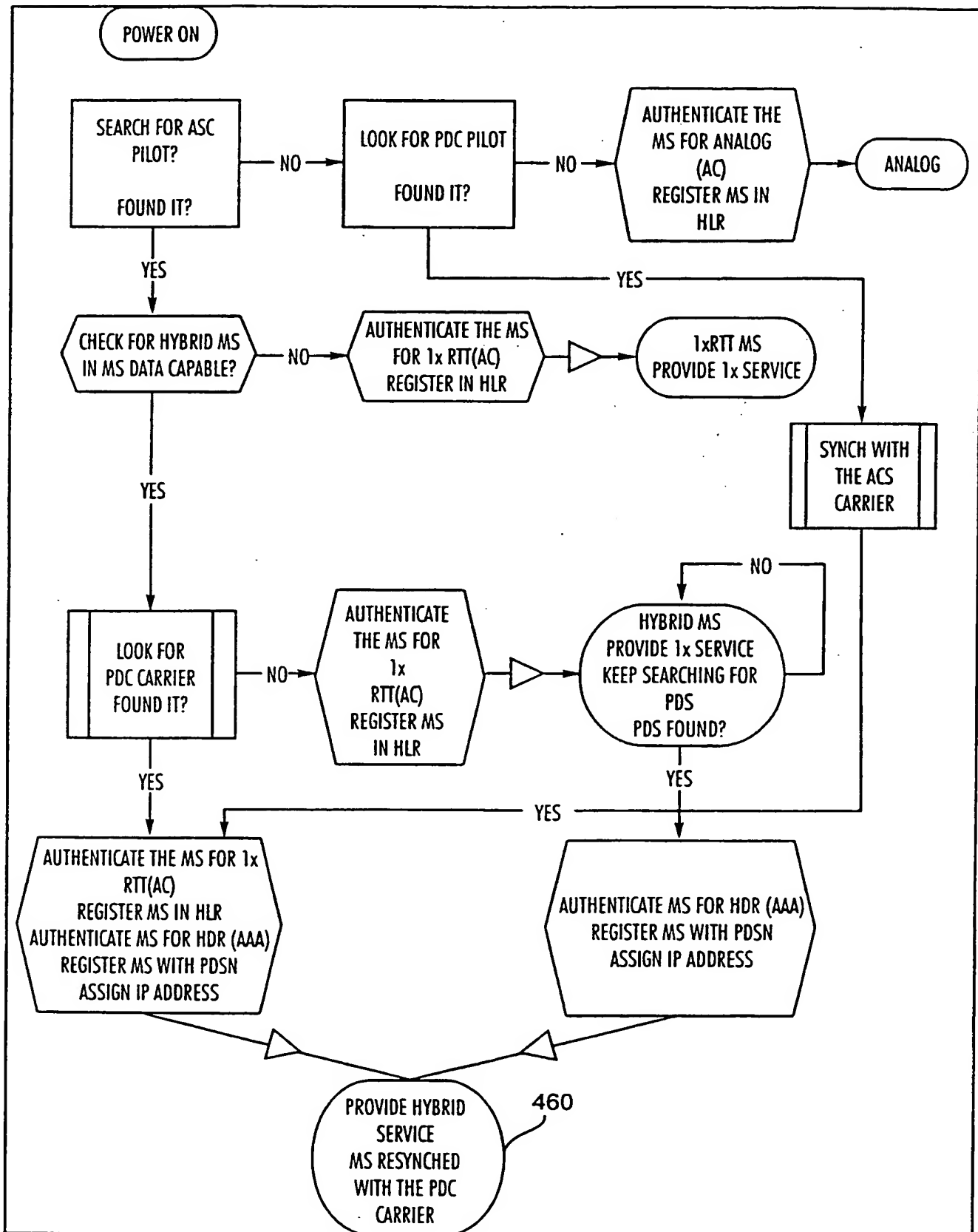Else
   Call is not placed ——450

3.1 <u>POWER ON</u>

Fig. 9

3.4   <u>INCOMING VOICE CALL IN THE IDLE STATE</u>

<u>MS is on PDC</u>
<u>MSC gets the call</u>   470
<u>MSC checks the COS for Automatic switch for voice call</u>
<u>If feature is ON</u>
         <u>MSC instructs the MS to search for the ASC</u>
         <u>MS finds the ASC and informs the MSC</u>
         <u>MS switches to ASC</u>
         <u>MSC sends that call to the MS → call is ON</u>
         <u>Call is complete (Release)</u>
480   <u>MSC instructs the MS to synch back with the PDC</u>
         <u>MS is synched with PDC</u>
<u>Else</u>

     <u>MSC sends an SMS to the user telling him about the call</u>
     <u>If MS accepts the call</u>
         <u>MSC instructs the MS to search for the ASC</u>
         <u>MS finds the ASC and informs the MSC</u>
         <u>MS switches to ASC</u>
         <u>MSC sends that call to the MS → call is ON</u>
490   <u>Call is complete (Release)</u>
         <u>MSC instructs the MS to synch back with the PDC</u>
         <u>MS is synched with PDC</u>
     <u>Else</u>

     <u>Call is rejected</u>

Fig. 10
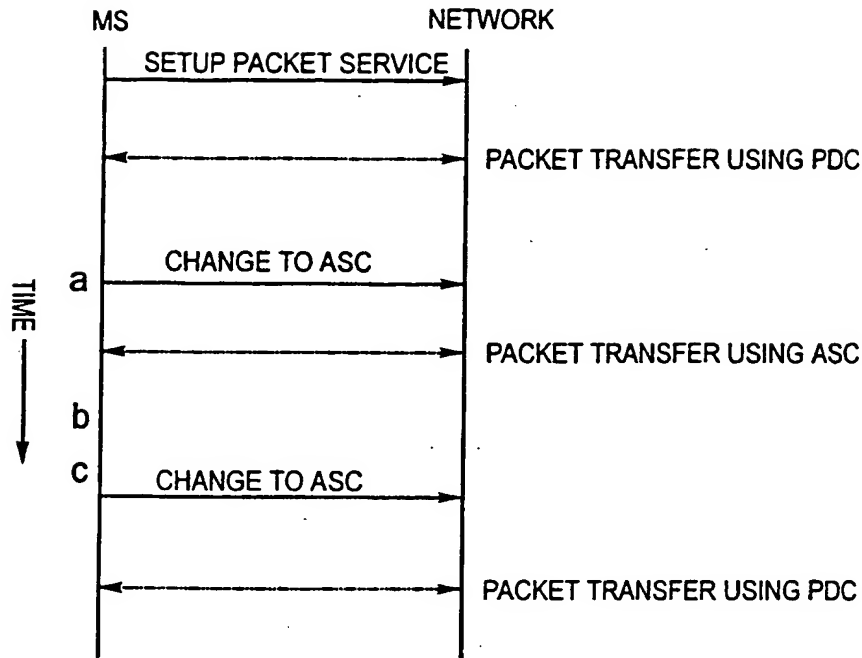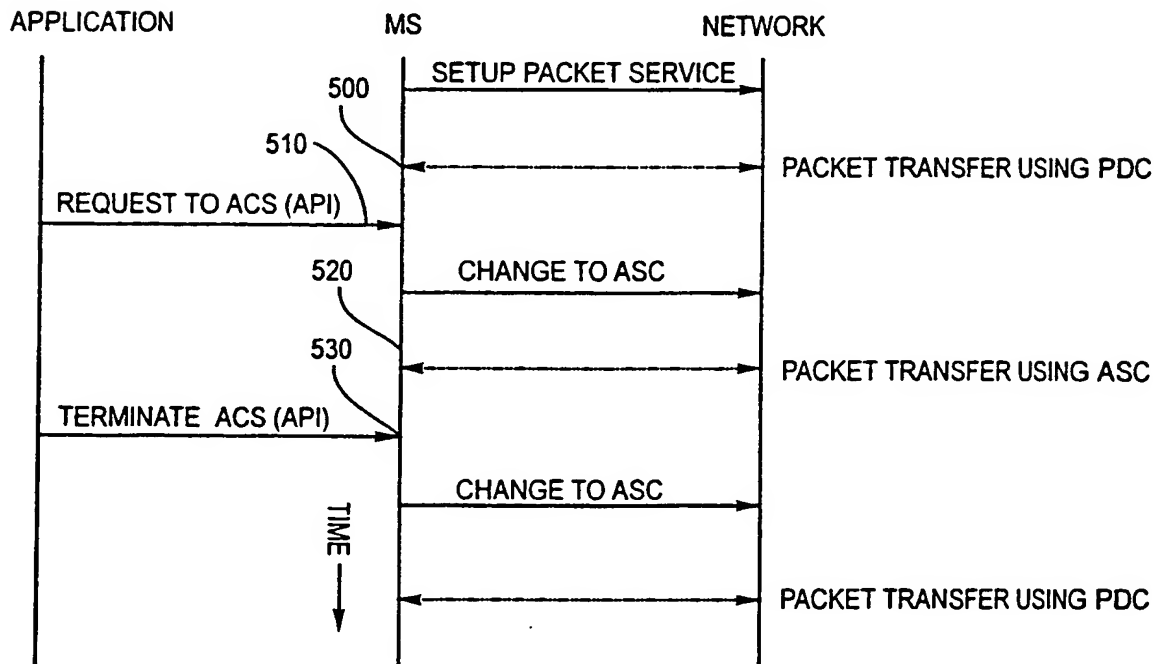
Fig. 11

Fig. 12

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7   H04L12/28   H04L12/56   H04Q7/38   H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7   H04L   H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 533 019 A (JAYAPALAN JAY P) 2 July 1996 (1996-07-02)	1,7-13, 20
A	column 2, line 32 - line 38	2-6, 14-19, 21,22
	column 4, line 11 - line 37 column 4, line 62 -column 5, line 8 column 7, line 62 -column 8, line 12 ---	
X	WO 99 11032 A (NOKIA TELECOMMUNICATIONS OY ;PELTOLA JUKKA (FI)) 4 March 1999 (1999-03-04)	1,7-13, 20
A	page 5, line 7 - line 28	2-6, 14-19, 21,22
	page 6, line 7 - line 14; figures 5,6 --- -/--	

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 March 2001	03/04/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Sorrentino, A

Form PCT/ISA/210 (second sheet) (July 1992)

1

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 115 233 A (KREBS JAY R ET AL) 19 May 1992 (1992-05-19)	7-12
A	column 2, line 25 - line 47 column 3, line 24 - line 44 ---	1,13,20
X	WO 95 25407 A (SIERRA WIRELESS INC ;TOMS NORMAN (CA)) 21 September 1995 (1995-09-21)	7
A	column 3, line 2 - line 9; claims 13-16; figure 2 ---	1,13,20
A	WO 99 16266 A (ERICSSON TELEFON AB L M) 1 April 1999 (1999-04-01) page 9, line 4 - line 21 page 11, line 18 - line 24 -----	1,7,13, 20

1

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5533019	A	02-07-1996	CA	2156636 A	10-08-1995
			FI	954571 A	27-09-1995
			JP	8508870 T	17-09-1996
			SE	9503360 A	30-11-1995
			WO	9521492 A	10-08-1995
WO 9911032	A	04-03-1999	FI	973486 A	26-02-1999
			AU	8865498 A	16-03-1999
US 5115233	A	19-05-1992	CA	1306503 A	18-08-1992
			GB	2217149 A,B	18-10-1989
			GB	2258368 A,B	03-02-1993
			HK	149295 A	29-09-1995
			JP	1290326 A	22-11-1989
WO 9525407	A	21-09-1995	AU	1943595 A	03-10-1995
WO 9916266	A	01-04-1999	AU	9287698 A	12-04-1999
			BR	9812522 A	25-07-2000
			EP	1018275 A	12-07-2000
			ZA	9808571 A	31-03-1999

CORRECTED VERSION

(51) International Patent Classification⁷: H04L 12/28, 12/56, H04Q 7/38, 7/22

(21) International Application Number: PCT/EP00/11732

(22) International Filing Date:
24 November 2000 (24.11.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/167,838   29 November 1999 (29.11.1999)   US
60/169,195   6 December 1999 (06.12.1999)   US
09/474,056   28 December 1999 (28.12.1999)   US

(71) Applicant: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventors: DJUPHAMMAR, Hakan, O.; 12959 Chaparral Ridge Road, San Diego, CA 92130 (US). NASSER, Mohamad, I.; 7878 Norcanyon Way, San Diego, CA 92126 (US). BASILIER, Henrik; 1632 Ocean View Avenue, Kensington, CA 94704 (US).

(74) Agent: HOFFMANN . EITLE; Arabellastrasse 4, 81925 Munich (DE).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
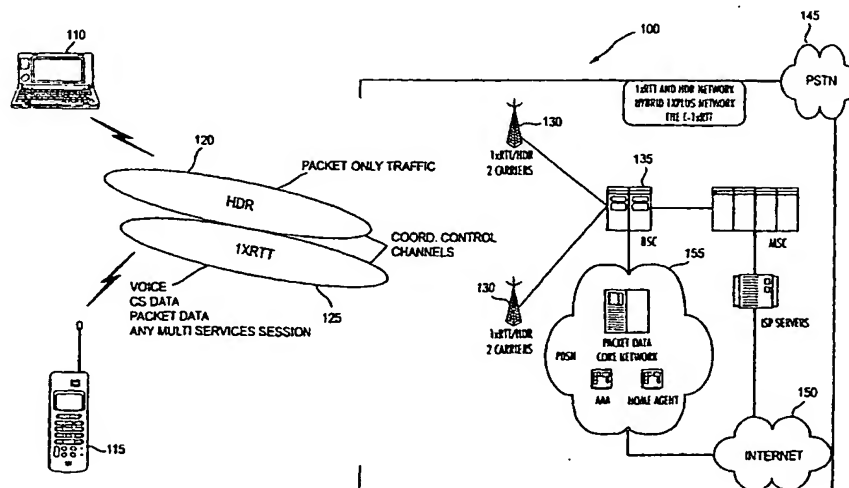
Published:
— with international search report

(54) Title: COMBINED CDMA MULTI-SERVICE CARRIER AND TDMA/CDMA PACKET CARRIER

(57) Abstract: The present invention provides systems and methods for coordinating calls within hybrid cells that support both an all services carrier and a best-efforts carrier, wherein the all services carrier supports real-time and non-real-time services and the best efforts carrier supports only non-real-time services. In one embodiment of the invention, the all services carrier is a 1xRTT carrier and the best-efforts carrier is an HDR carrier. Calls may be placed on either carrier and transferred between the carriers as circumstances dictate. In addition, the present invention provides systems and methods to dynamically determine the most appropriate carrier for a given call.

WO 01/41368 A1

(48) Date of publication of this corrected version:

20 September 2001

(15) Information about Correction:
see PCT Gazette No. 38/2001 of 20 September 2001, Section II

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

This Page Blank (uspto)